DATA TRANSFER

Technical field of the invention

The present invention relates to the immediate transfer of packet data from a network server to a mobile communication station over a digital radio communication network.

Technical background

With a digital radio communication network supporting packet data transfer, wireless access to external packet data networks, such as the Internet, corporate intranets and X.25 networks, can be offered to the users of the digital radio communication network. Thus, the digital radio communication network will be a wireless extension of, for example, the Internet and existing X.25 networks. Subscribers to the radio network will be able to use most of the applications designed for these data packet protocols, such as Web browsing and e-mail etc., from their wireless equipment with which they access the digital radio communication network. Also, the users do not have to dial into an Internet Service Provider (ISP).

An example of a digital radio communication network which will be able to transfer packet data is the Global System for Mobile Communication (GSM) network. The packet data transferring capabilities of the GSM network is provided by the General Packet Radio Service (GPRS). GPRS is a standardisation from the European Telecommunications Standard Institute (ETSI) on packet data in GSM systems.

There are basically two different techniques to initiate a packet data transfer between a user of a packet data service provided by a digital radio communication network and a packet data network server being able to communicate with the digital radio communication

network, user initiated packet data transfer and network initiated packet data transfer.

The first technique, user initiated packet data transfer, which is the default technique used, means that the user has to switch on his mobile communication station, after which the station identifies itself to those parts of the digital radio communication network that provides the packet data service and then initiates an activation of a packet data service to be used by the mobile communication station. The step of identifying the station involves providing the radio network with the identity and the whereabouts of the station. The activation of a packet data service is needed in order for the radio network to allocate the network resources needed when the station uses the packet data service. The user can then use the service for requesting information from network servers, download files etc.

The second technique, network initiated packet data transfer, is used when pushing information to the wireless communication station. Three important prerequisites for this technique are that the station has to be switched on, that the station has identified itself to those parts of the digital radio communication network that provides the packet data service, and that a packet data protocol address has been allocated to the station. The radio network is then able to on its own activate a packet data service for the station.

In both of these techniques, the activation of a packet data service involves certain procedures to be performed in the network for initialising the service. After activation, packet data addressed to the Packet Data Protocol (PDP) address that has been allocated to a mobile communication station will be routed to that station. A PDP address can be allocated to the station either as a static or a dynamic PDP address. Thus, the PDP address to be used by a server wishing to push data to a mobile communication station, i.e. to transfer data

without the station having specifically requested the data, is either a permanent (static) or a temporary (dynamic) address allocated to that station.

A static PDP address is permanently allocated to a particular mobile communication station, i.e. a subscriber, and must be stored in some kind of repository in, or connected to, the operator's digital radio communication network, together with other kind of data and information defining a subscribers subscription with the operator. A dynamic PDP address on the other hand, is only temporarily allocated to a subscription as long as the subscriber wishes to use the packet data service provided by the radio network. The dynamic PDP address must also be stored in some kind of repository in, or connected to, the operator's network. This PDP address must be known to the server before transmitting any packet data to the station.

The PDP address, irrespective of whether it is static or dynamic, needs to be known to a server that wishes to transfer packet data to the station. The PDP address can become known to the server by making an inquiry to the appropriate repository, possibly different repositories depending on whether static or dynamic addresses are used, in the operator's digital radio communication network.

A disadvantage with having to inquire the digital radio communication network for a particular PDP address, is that it may result in a heavy load on the radio network and/or any server connected to the radio network and storing the above mentioned repository. This is due to the generated signalling against the repository storing PDP addresses. If the signalling against the repository is too extensive, other kind of inquiries for subscription data, vital to the operation of the radio network, may be delayed or blocked. A repository could even be caused to collapse by an inquiring server, if the server were to perform a so called spamming, i.e.

executing a large number of inquires towards the radio network and the repository. A repository storing subscription data in the network is perhaps the most important part of the network, since if the repository goes down, the hole network goes down.

Additionally, if using static PDP addresses, wherein an address is permanently allocated to a subscription, one faces the possibility of running out of addresses. In the most popular packet data network in use today, the Internet, this problem is soon a reality because of the tremendous growth of users and appliances that wish to have an Internet Protocol address.

The solution to the problem of running out of static addresses, is to have a defined set of addresses in the network from which dynamic addresses are temporarily allocated to the subscribers. However, when using dynamic addresses, one faces the problem that the address allocated to a subscriber suddenly may change. For example, if a mobile communication station having a dynamic address allocated to it is switched off, the address will be de-allocated. When switching the station on again and activating the packet data service, it is very likely that another address will be temporarily allocated to the station. Thus, a server needs to inquire about the station's PDP address each time a new packet data transfer is started, resulting in the disadvantage described above regarding generated signalling load in the radio network.

Furthermore, when personal telephone numbers are offered to the subscribers, the telephone numbers will be portable between different operators and therefore no longer reflect with what operator a user has his subscription. When making an ordinary telephone call to a mobile station having a portable number, the call will be routed via some kind of repository associating each number with the user's defined selection of operator. Such mechanism does however not exist for routing a PDP

address request, concerning what PDP address that is allocated to a particular subscription, to the right operator. Thus, when using portable numbers, a server wishing to push data to a mobile communication station does not know to what operator, and thus, to what operator repository, an inquiry about a user's PDP address should be directed. Also, there exists no mechanism today that will handle the routing of such an inquiry to the right operator repository.

Another disadvantage is that if the radio network does not provide a store and forward facility, a server wishing to push data to a subscriber needs to know that the subscriber has a working PDP connection, otherwise data packets from the server addressed to the subscriber will be lost.

Summary of the invention

An object of the present invention is to overcome the disadvantages and drawbacks described above that are present when a server in a packet data network, which network is arranged in communication with a digital radio communication network, is to initialise the transfer of packet data to a mobile communication station in the digital radio communication network.

According to the present invention, said object is achieved by a method, an arrangement and a program storage device having the features as defined in the appended claims.

The present invention is based on the idea that a network server, that wants to transfer packet data to a mobile communication station via a digital radio communication network, requests the mobile station to set up a packet data protocol connection with the server. The request is accomplished by sending a message to the station, via a message service provided by the radio network, using a subscriber's unique user identification number. In reply to the received message, the station

identifies itself to the packet radio network, if not already identified, activates a packet data service provided by the packet radio network, if not already activated, and establishes a PDP connection with the requesting server. Using this PDP connection, the server may transfer packet data to the mobile communication station.

According to a first aspect of the invention, there is provided a method for initiating immediate transfer of packet data from a network server to a mobile communication station over a digital radio communication network, such as a Global System for Mobile Communication (GSM) network providing a General Packet Radio Service (GPRS), including the steps of:

sending a message to the mobile communication station using a message service, such as a Short Message Service, provided by the digital radio communication network, said message including a first packet data network address, such as an Internet Protocol or an X.25 protocol address, of said network server;

extracting the first packet data network address from said message by means of an application executing on the mobile communication station; and

establishing, from the application of the mobile communication station having a second packet data network address, a packet data protocol session with said network server using said first packet data network address,

whereby the network server is able to transfer packet data to the mobile communication station and the application using said packet data protocol session.

According to a second aspect of the invention there is provided an arrangement at a mobile communication station for facilitating immediate transfer of packet data from a network server to a mobile communication station over a digital radio communication network, such as a Global System for Mobile Communication (GSM) network

providing a General Packet Radio Service (GPRS), including:

first receiving means for receiving a message from a message service, such as a Short Message Service, provided by the digital radio communication network, said message including a first packet data network address, such as an Internet Protocol or an X.25 protocol address, of said network server;

extracting means for extracting the first packet data network address from said message; and

packet data protocol means for establishing a packet data protocol session with said network server using said first packet data network address, and for receiving packet data from the network server addressed to a second packet data network address, which second packet data network address is allocated to the mobile communication station.

According to a third aspect of the invention there is provided a program storage device containing a sequence of instructions for a microprocessor to perform the steps of:

causing a mobile communication station to receive a message from a message service, such as a Short Message Service, provided by a digital radio communication network, such as a Global System for Mobile Communication (GSM) network providing a General Packet Radio Service (GPRS), said message including a first packet data network address, such as an Internet Protocol or an X.25 protocol address, of said network server;

causing the mobile communication station to extract the first packet data network address from said message;

causing the mobile communication station, to which a second packet data network address is allocated, to establish a packet data protocol session with said network server using said first packet data network address; and

causing the mobile communication station to receive packet data, addressed to the second packet data network address, from the network server via said packet data protocol session.

According to a fourth aspect of the invention there is provided a message data format used for initiating the transfer of packet data from a network server to a mobile communication station without interaction with a user of the mobile communication station, the mobile communication station being the addressee of a message having said message data format, the message data format including:

a field with an activation code which is to be decoded by an application program in said mobile communication station, said activation code indicating to the application program that said message was initiated by a network server wishing to transfer packet data to the mobile communication station, wherein further fields of the message data format are decoded by said application program and thereby facilitating the reception of packet data from the network server; and

a field with a packet data network address which is to be decoded by said application program, said packet data network address indicating to the application program which network server it should establish a packet data protocol session with.

Thus, a network server does not have to inquire a repository within, or connected to, the radio network for a PDP address to a station, and will therefore not contribute to a signalling load against the repository. In accordance with what has been described above, the invention provides this advantage irrespective of whether static or dynamic PDP addresses are used in the radio network system. Furthermore, in case of number portability, the question where to direct an inquiry for a PDP address will never arise.

Preferably, if the identity and/or the location of the subscriber is not known to the packet data service part of the radio network, the application initiates the procedures in the radio network of identifying and/or location updating the subscriber.

Preferably, if the subscriber does not have a packet data service activated at the radio network, the application requests that the radio network should activate such a packet data service. In connection with such an activation, the radio network allocates a temporary packet data protocol address to the station. Alternatively, the temporary PDP address is allocated to the station by a server, a corporate server or a server of an Internet Service Provider, which is connected to the radio network.

It is also preferred that the application includes means for examining an activation code in said message. This code identifies the message from a server wishing to push data from other messages received by the station. The application will access the network server using the packet data protocol, only if the correct activation code is found. Alternatively, if the subscriber has not identified itself to the packet data service part of the radio communication network, the mobile station performs such an identification only if the message received included the correct activation code.

Furthermore, the application preferably includes means for examining a service indication field of the message received by the mobile station. The application is arranged to either display a text message on a display of the mobile station or play a voice message using a loudspeaker of the mobile station, the message being derived from the service indication field. If the user replies negatively to the message, the application will not access the network server, or, if the mobile station has not been identified, it will not identify the mobile station subscriber to the radio network.

The application furthermore has means for extracting a ciphering key from the received message and for calculating a response based on this key. The response is sent together with the identification number of the mobile station subscriber to the network server for verification of the subscriber.

Thus, the invention is advantageous since it enables pushing of packet data to a mobile communication station even if the station has not identified itself to the packet data service part of the digital radio communication network, or, if it has identified itself, if there is no active packet data service associated with the mobile communication station, and, thus, no valid packet data protocol address allocated to the station. With a message, via a message service and initialised by the external network server wishing to push data, to the mobile communication station, the steps of identifying the station to the radio packet network, if not already identified, and activating a packet data service, if not already activated, are initialised from the network.

It does not matter if the subscriber has identified itself or not for the packet data service part of the digital radio communication network, if the subscriber has been allocated a PDP address or not, or, when the subscriber has an allocated PDP address, if the PDP address is static or dynamic.

Furthermore, the invention is advantageous in connection with mobile communication stations that can identify themselves to both a circuit-switched traffic service and packet-switched traffic service at the same time, but which stations do not support both kinds of traffic simultaneously. If the station is involved in circuit switched traffic, it can still receive a message via the message service, whereby the application in the mobile communication station can activate a packet data service, which activation includes that a PDP address is allocated to the station. Thus, the station can be

initiated from the network server to switch from circuit-switched traffic to packet-switched traffic, whereby the network server can push packet data to the station. Examples of such stations are class B stations in a GSM network implementing GPRS.

The invention is also advantageous in connection with mobile communication stations that can only identify themselves to one type of service at a time, and only support traffic of the service to which it is identified, i.e. they are either identified to the circuit-switched traffic service or the packet-switched traffic service. As described above, the station can receive a message while involved in circuit-switched traffic. The application can then identify itself to the packet-switched traffic service instead and activate a packet data service that involves allocating a PDP address to the station. Thus, the network server can initiate a switch of traffic type and can push packet data to the station. Examples of such stations are class C stations in a GSM network implementing GPRS.

Another advantage with the invention is that it provides an external network server with the ability to immediately transfer packet data to a mobile communication station. It does not have to wait until the station happens to have an active packet data service and an allocated PDP address, since the activation of such a service and the allocation of a PDP address is initiated by the message sent to the station from the server. Moreover, there will be less risk that packets sent from the server are lost due to that the radio network does facilitate store and forward of data packets.

Another advantage is that as a user of the mobile communication station will have the option of accepting or aborting the packet data transfer from the network server about to be initiated. By responding to the message presented to the user and describing the service, the user will be able to control the billing of his sub-

scription. This control of billing is applicable in a radio network system providing a packet data service in which the subscriber is billed for the number of sent, as well as received, data packets from/to the mobile communication station. Thus, if a user would not have the option of denying packet data from network servers, he would have to pay for all packet data any server would send to him by force, even if it concerns information of no interest for the user.

Furthermore, with the response to the network server, which is based on the ciphering key previously transmitted by the server, the server is able to verify that the packet data will be transferred to the right user.

It is to be understood that what is meant by the expression mobile communication station, or station for short, is either a stand-alone RF (Radio Frequency) transceiver having processing capabilities and displaying means, or, a RF transceiver together with any kind of portable processing means, such as a portable computer, wherein the RF transceiver is arranged in communication with the portable processing means.

Brief description of the drawings

Further features and advantages of the invention will become more readily apparent from the following detailed description of an exemplifying embodiment of the invention when taken in conjunction with the accompanying drawings, in which:

Fig. 1 schematically shows an exemplified digital radio communication network providing a packet data service;

Fig. 2 shows the interaction between the elements in the network of Fig. 1 in accordance with the embodiment of the invention;

Fig. 3 shows an exemplifying structure of the content of a message provided by a message service in accordance with the embodiment of the invention; and

Fig. 4 shows a flow chart of the operation of the mobile communication station in accordance with the embodiment of the invention.

Detailed description of a preferred embodiment

In Fig. 1 an exemplified digital radio communication network providing a packet data service is schematically shown. The network is the Global System for Mobile Communication (GSM) network. The packet data transferring capabilities of the GSM network is provided by the General Packet Radio Service (GPRS). GPRS is a standardisation from the European Telecommunications Standard Institute (ETSI) on packet data in GSM systems.

Since the architecture, and operational aspects, of GSM are well known to persons skilled in the art, only those aspects of GSM which are of direct relevance to the present invention will be covered by this application.

For information about GPRS and GSM, reference is made to the following ETSI standardisation documents:

- EN 301 113 V6.1.1 (1998-11)(GSM 02.60 version 6.1.1 Release 1997);
- Draft ETSI EN 301 344 V6.4.0 (1999-08) (GSM 03.60 version 6.4.0 Release 1997);
- TS 101 348 V6.3.0 (1998-10) (GSM 09.61 version 6.3.0 Release 1997),

all of which documents are incorporated herein by reference.

Basically, GPRS adds two new nodes to the GSM system for handling packet traffic, a Serving GPRS Support Node (SGSN) 100 and a Gateway GPRS Support Node (GGSN) 110. The SGSN 100 is the node within the GSM infrastructure that sends and receives packet data to and from the mobile station via the Base Station System (BSS) 120. The SGSN 100 performs basically the same functions for the

packet-switched service as the Mobile Switching Centre/ Visitor Location Register (MSC/VLR) 130 does for the circuit-switched service. It handles user access control, security functions and mobility management. The SGSN also transfers packets between the GPRS terminals 140, i.e. mobile communication stations, and the GGSN 110. Furthermore, it handles PDP contexts for connections with any server 150 in any external packet data network 160. The GGSN 110, which is connected to the SGSN 100, is the gateway of the GPRS system to external packet data networks 160 and routes packets between the SGSN 100 and the external network 160.

In order for the GSM/GPRS system to be able to handle terminals that can be attached to both a packet-switched service and a circuit-switched service at the same time in an efficient way, it is preferred that the SGSN 100 is able to communicate with the MSC/VLR 130. Furthermore, the SGSN 100 must be connected to the Home Location Register (HLR) 170 if the functionality of the HLR is to be used for the GPRS service. Indicated in Fig. 1 are also a Short Message Service Centre (SMS-C) 180 and a Gateway Mobile Switching Centre (GMSC) 185, which contain functionality for transferring short messages, i.e. SMS messages, to the mobile communication station 140.

In order for a GPRS subscriber to be able to connect himself to an external packet data network, the procedure GPRS attach needs to be executed. By means of the GPRS attach procedure, the mobile station identifies itself to the radio network. The station 140 sends a request to be GPRS attached to the SGSN 100. If this SGSN 100 is a different SGSN from when the station last was detached, as a consequence of that the station has been moving around between the last detach and the new attach, a location update procedure is executed in order for the radio network system to know the new position of the station. The mobile station, i.e. GPRS subscriber, is

authenticated by the HLR 170 and subscriber data from the HLR 170 is inserted into the SGSN 100.

For a GPRS subscriber to be able to receive packet data, a GPRS Packet Data Protocol context needs to be activated. The PDP context describes the characteristics of the connection to an external network. The mobile station 140 activates a packet data service by sending a request for context activation to the SGSN 100. The SGSN 100 validates the request based on subscription information received from the HLR during GPRS attach. The relevant GGSN 110 assigns a dynamic IP address to the mobile station 140. The dynamic IP address is either selected from a set of IP addresses allocated to the radio network, or, it is received from a Remote Authentication Dial-In User Service (RADIUS) server 190 communicating with the GGSN 110. It is possible to use several other services for receiving a dynamic IP address, for example from a service utilising the Dynamic Host Configuration Protocol (DHCP). The RADIUS server 190 could, for example, be a server in a corporate network or a server of an Internet Service Provider, wherein the first is used to provide the user with access to a corporate packet data network and the latter to the Internet. Thus, either the GGSN 110 acts as an internal repository for IP address within the radio network, or the RADIUS server acts as an external repository connected to the radio network.

Fig. 2 shows the interaction between the elements in the network of Fig. 1 in accordance with the embodiment of the invention. With reference to the signalling flow shown in Fig. 2, the process involving the elements of Fig. 1 is as follows:

1. An external network server 150 connected to the Internet 160 wants to send, i.e. push, packet data to a GPRS subscriber 140 over a TCP/IP connection. The network server 150 connects to the Short Message Service Centre, SMS-C 180, and initiates the sending

of an SMS short message to a GPRS-subscriber 140 having a particular Mobile Station Integrated Services Digital Network, MSISDN number. The SMS message includes, inter alia, an activation code and the network server's IP-address and the network server's port number used to set-up a TCP/IP-based connection between the mobile communication station (MCS) 140 and the network server 150. An example of the complete content of the SMS message will be described with reference to Fig. 3.

2. The SMS-C 180 then sends the SMS message to the GPRS-subscriber 140 through either the GSM network or the GPRS network, i.e. through the GMSC 185 and the BSS 120 via either the MSC 130 or the SGSN 100. From the BSS 120 to the mobile station 140, the SMS message is then either transferred over a GSM signalling channel or on a GPRS traffic channel. The signalling between the SMS-C 180 and the BSS 120 and the transfer of the SMS message from the BSS 120 to the MCS 140 over the GPRS or GSM radio interface is all in accordance with the state of the art.

3. The mobile communication station has an application that is started, or, which is already running, when the SMS message is received by the mobile station. The application examines the activation code in the received SMS message. If the code corresponds to a predefined code which is accepted by the application, the application processing proceeds, otherwise the application processing is stopped. Thus, if no activation code is found, the SMS message is treated in the usual way, which is outside the scope of the present invention.

4. If the activation code was accepted by the application, the application processing continues to the GPRS connection phase. This phase starts with an examination of a service indication field in the received SMS message. A text is displayed on a display of the

mobile station describing which type of service that will be started. The text either is pre-stored in the mobile station and associated with a particular content of the service indication field, or, the text is extracted from another part of the received SMS message. In response to the displayed text, the user accepts or denies the offered service, causing the GPRS connection phase to be continued or aborted.

According to the invention, if the service offered is accepted, the application identifies the mobile station for the packet data service part of the system, if it is not already identified. In the embodiment, this corresponds to checking whether the GPRS subscriber is GPRS attached or not. If the mobile station is not attached, the application performs a GPRS attach. The GPRS attach is preferably performed in accordance with standard procedure, see for example Draft ETSI EN 301 344 V6.4.0 (1999-08), chapter 6.2.

5. The application checks if the mobile station 140 has a valid IP-address(i.e. if it has a working TCP/IP connection). If not, the application requests the digital radio communication network to activate a packet data service to be used by the mobile communication station 140, i.e., in this embodiment, it initiates the performance of a GPRS PDP Context Activation. The application then receives a dynamically allocated IP-address from the radio network, or, as illustrated in the diagram of Fig. 2, from a Radius server 190 via the radio network. The GPRS PDP Context Activation and the transfer of a dynamic IP-address are preferably performed in accordance with standard procedure, see for example TS 101 348 V6.3.0 (1998-10), chapter 11.2.1.2. However, the received packet data network address could be an address of any other packet data protocol, such as an X.25 address.

6. The application calculates a response to the ciphering key received in the SMS message.

7. The application then finds out the GPRS-user's 140 MSISDN number and prepares a reply back to the external network server 150 that initiated the original SMS message. The message contains the reply to the ciphering key and the GPRS-user's MSISDN number.

8. The application in the mobile station 140 then sets up a TCP/IP connection towards the IP-address and the port number received in the SMS message and designating the external network server 150. It then sends over the reply message in order for the external network server 150 to verify that the correct GPRS user 140 answered the SMS message.

9. The network server 150 is then able to send packet data to the GPRS-user 140 using the TCP/IP connection set up by the application in the GPRS-user's mobile communication station 140.

In Fig. 3 an exemplifying structure of the content of a message provided by the message service, in accordance with the invention, is shown.

The message content is divided into a number of information fields. Field 300 includes the version of the SMS message layout used, i.e. a particular version indicates to the application a certain predefined number of fields, each of which has a predefined length. Field 300 includes a GPRS activation code which distinguishes the message from other kind of SMS messages. Field 310 includes an IP-address, IPv4 or IPv6, to the network server from which the message was sent. Field 320 includes a port number of the network server to be used when establishing a TCP/IP connection with the network server. Field 330 is a service indication field. Based on the content of this field 330, a message is presented to the GPRS user. Field 340 includes a ciphering key, which is used by the application to calculate a response to the SMS message. Field 350 includes an ordinary checksum.

Field 355 indicates what quality of service the network server wishes that the mobile communication station requests from the GSM network when using the packet data service. Finally, field 360 is made up of spare characters, which number is dependant on the number of characters used by the previous fields and, thus, on the particular message layout version. These spare characters are, for example, used for storing a text message referred to by the service indication field 330. The number of characters in each field of the message in Fig. 3 is a mere exemplification and may, as indicated above, vary with the SMS message layout version used.

Fig. 4 a flow chart of the operation of the mobile communication station and its application is shown.

In step S1, the processing within the mobile communication station is started by an incoming SMS message. In step S2 it is then checked if the application in accordance with the invention has been started or not. If the application is not running the processing continues to step S3, in which step the application is started, and then to step S4. If the application is already running, the processing continues with step S4 directly after step S2.

In step S4 the application extracts an activation code, i.e. the content of field 300, from the SMS message The application then examines the activation code in step S5. If the activation code is a code that is accepted by the application, the processing of the application continues to step S6, otherwise the running of the application is stopped and the processing returns to step S1. In step S6 the application extracts the remaining information stored in the different fields of the SMS message, which fields and their contents have been described with reference to Fig. 3, and examines a service indicator included in the service indication field 330. In step S6 the application also presents a message, for example, in the form of a text displayed on a display of the mobile

communication station, for the user of the mobile station. The message indicates the service about to be initiated from the network server that initiated the SMS message. The application then waits for a response to the message from the user. If the user accepts the service, the application processing continues to step S7, otherwise the running of the application is stopped and the processing returns to step S1.

In step S7 the application checks whether or not the mobile station is GPRS attached. This check is performed in a way which is conventional for a GPRS mobile station. If the mobile station is not GPRS attached, the application initiates a GPRS attach in conventional manner in step S8, after which the processing continues to step S9. If the mobile station is already GPRS attached, the application processing continues directly to step S9. In step S9 the application checks whether or not the mobile station has a TCP/IP connection that can be utilised, i.e. if it has a valid IP address or not. If the mobile station does not have a valid IP address, the application in step 10 initiates a GPRS PDP Context Activation, i.e. activates a packet data service, in accordance with what has been described above, after which activation the application processing continues to step S11. If the mobile station already has a valid IP address, the application processing continues directly from step S9 to step S11.

In step S11 the application calculates a response to the ciphering key extracted from field 340 of the SMS message. The calculation is performed in accordance with a predefined algorithm. The application then in step S12 recalls the GPRS users identification number, i.e. the MSISDN number, from within the mobile station. In step S13 the application establishes a packet data protocol session with the external network server using the server's IP address extracted from field 310 and the server's port number extracted from field 320 in the SMS

message. The application then in step S13 sends a message to the external network server in reply to the received SMS message. The message sent to the server includes the response calculated in step S11 and the MSISDN number recalled in step S12. The message is used by the network server to verify the GPRS user. The processing in the mobile station for initiating the transfer of packet data from the external network server to the mobile station ends in step S14.

After the above processing steps of Fig. 4 have been performed in the mobile station, the network server can use the established TCP/IP connection to transfer packet data to the mobile station.

The means included by the application according to the invention for performing the tasks described in the exemplifying embodiment, and elsewhere in this application, are software code modules executed by a microprocessor arranged within the mobile communication station, which means are supported and/or interact with additional hardware within the mobile communication station in accordance with what is appropriate and obvious to a person skilled in the art. The implementation of these means, or software code modules, are obvious for a person skilled in the art of programming and being familiar with the GSM system in general, and the GPRS system in particular.

Although the invention has been described with reference to a specific exemplifying embodiment based on a GSM system providing a GPRS service, the described embodiment is not intended to limit the scope of the invention, as defined by the appended claims. Instead, the present invention is well suited for any digital radio communication network that provides a packet data service to its connected wireless users. Also, many different alterations, modifications and the like, within the scope of the appended claims, will become apparent for those skilled in the art.